

ensemble driven by the SRES A1B emissions scenario. He found that: all 10 models projected declines of September sea ice extent of over 30 percent by the middle of the 21st century (i.e., 2045–2055); 4 of 10 models projected declines September sea ice in excess of 80 percent by mid-21st century; and 7 of 10 models lose over 97 percent of their September sea ice by the end of the 21st century (i.e., 2090–2099) (DeWeaver 2007).

Stroeve et al. (2007, pp. 1–5) compared observed Arctic sea ice extent from 1953–2006 with 20th and 21st century simulation results from an ensemble of 18 AR4 models forced with the SRES A1B emission scenario. Like Overland and Wang (2007a) and DeWeaver (2007), Stroeve et al. (2007, pp. 1–5) applied a selection criterion to limit the number of models used for comparison. Of the original 18 models in the ensemble, 13 were selected because their performance simulating 20th century September sea ice extent satisfied the selection criterion established by the authors (i.e., model

simulations for the the period 1953–1995 had to be within 20 percent of observations). The observational record for the Arctic by Stroeve et al. (2007, pp. 1–5) made use of a blended record of PM satellite-era (post November 1978) and pre-PM satellite era data (early satellite observation, aircraft and ship reports) described by Meier et al. (2007, pp. 428–434) and spanning the years 1953–2006 (Stroeve et al. 2007, pp. 1–5).

Stroeve et al.'s (2007, pp. 1–5) results revealed that the observed trend of September sea ice from 1953–2006 (a decline of 7.8 ± 0.6 percent per decade) is three times larger than the 13-model mean trend (a decline of 2.5 ± 0.2 percent per decade). In addition, none of the 13 models or their individual ensemble members has trends in September sea ice as large as the observed trend for the entire observation period (1953–2006) or the 11-year period 1995–2006 (Stroeve et al. 2007, pp. 1–5) (see Figure 7). March sea ice trends are not as dramatic, but the modeled decreases are still smaller than

observed (Stroeve et al. 2007, pp. 1–5). Stroeve et al. (2007, pp. 1–5) offer two alternative interpretations to explain the discrepancies between the modeled results and the observational record. The first is that the “observed September trend is a statistically rare event and imprints of natural variability strongly dominate over any effect of GHG loading” (Stroeve et al. 2007, pp. 1–5). The second is that, if one accepts that the suite of simulations is a representative sample, “the models are deficient in their response to anthropogenic forcing” (Stroeve et al. 2007, pp. 1–5). Although there is some evidence that natural variability is influencing the sea ice decrease, Stroeve et al. (2007, pp. 1–5) believe that “while IPCC AR4 models incorporate many improvements compared to their predecessors, shortcomings remain” (Stroeve et al. 2007, pp. 1–5) when they are applied to the Arctic climate system, particularly in modeling Arctic Oscillation variability and accurately parameterizing sea ice thickness.

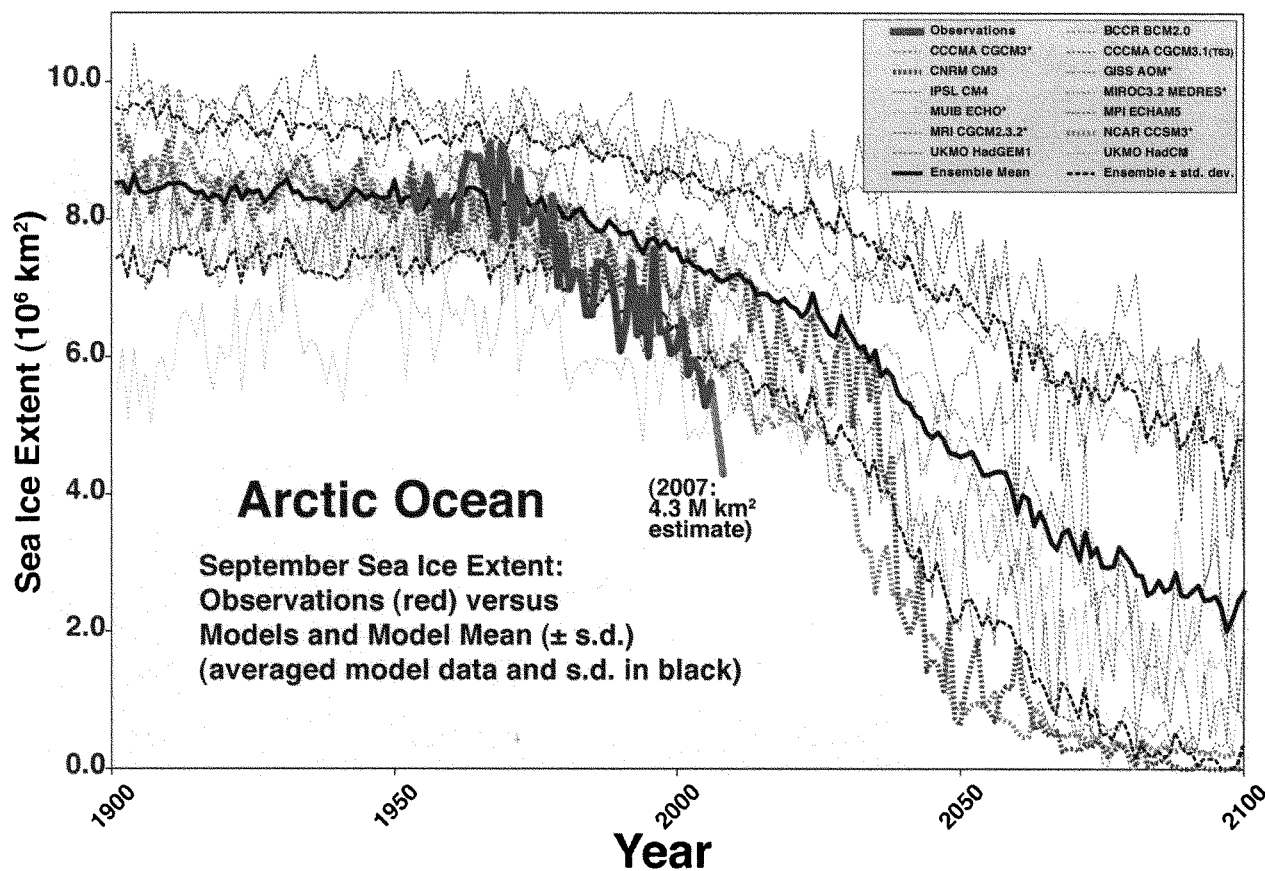


Figure 7. Arctic September sea ice extent. Comparison of observations with results of model runs (updated from Stroeve et al. 2007, pp. 1–5, used with permission).